

IMPACT OF GENDER AND ETHNIC COMPOSITION OF SOUTH AFRICAN BOARDS OF DIRECTORS ON INTELLECTUAL CAPITAL PERFORMANCE

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Abstract

This study examines the association between the gender and ethnic composition of boards of directors and firm performance in a transitional nation. In contrast to prior research that largely focuses on firm performance within a financial context, this study concentrates on intellectual capital performance. Using data collected from 84 South African, empirical results indicate a positive association between the percentage of female and non-white directors on the board and a firm's intellectual capital performance. Additional analysis shows the designation of female directors as an insider has a negative effect of intellectual capital performance. Designation of female and non-white directors as outsiders, meanwhile, has a positive influence on a firm's intellectual capital performance. Finally, there was no association between the percentage of non-white inside directors on the board and intellectual capital performance.

Keywords: *Intellectual capital performance; board structure; transitional economy; gender; ethnic background*

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1. Introduction

The modern business environment is one of enormous uncertainty and dynamic change. Firms are faced with ever increasing pressures from unstable capricious markets, new and complex information technology, widening globalization and considerable changes to the world's social infrastructure (Porter, 1986; Barlett and Ghoshal, 1989; Melin, 1992; Prahalad and Hamel, 1994). By the start of the new millennium, the economic infrastructures of many nations around the world had, or were going through, a significant transformation. For nearly two hundred years the properties that characterized the Industrial Age had defined business practices. Now, various business authorities recognize the driving force underlying the wealth-creation, performance and future survival of many firms is their intellectual capital (IC) (see, for example, Edvinsson and Malone, 1997; Stewart, 1997; Luthy, 1998; Bontis, 2000).

As the factors defining the Information Age have grown in prominence, IC analysts have suggested firms must significantly overhaul antiquated managerial practices inherited from the Industrial Age (see Organization of Economic Cooperation and Development (OECD), 2000 for a full review). The nature of IC dictates firms are increasingly reliant upon the development of intangible links with

various stakeholders possessing resources quintessential to a firm's future performance and survival (Brooking and Motta, 1996). Human resources, both current and potential, are often recognized as the essential component of IC that a firm must accumulate and fully utilize so as to optimize a firm's performance and survival (Sveiby, 2000). IC analysts have suggested a firm can best optimize its human resource capacity by fully drawing on all the various skills, knowledge and capabilities of this production factor (Pulic, 1998). This can be best achieved through diversification, particularly at the upper echelons of a firm.

Corporate governance experts have long advocated a board of directors can have significant impact on a firm's performance and future viability (Baysinger and Butler, 1985; Siciliano, 1996). This corporate governance mechanism is viewed as an essential means by which a firm can develop and maintain intangible coalitions and alliances with various stakeholders, including its human resources (Gilbert and Ivancevich, 2000). To fully maximize the ability of a board of directors to enhance a firm's future wealth-creation, performance and survival the composition of this corporate governance mechanism should not be overtly homogenous in nature (Westphal and Milton, 2000). Increased gender and ethnic diversity are often seen as two particular demographic features of a board of directors'

composition that can enhance its effectiveness in influencing a firm's potential (Provan, 1980; Chaganti, Mahjan and Sharma, 1985; Zahra and Pearce, 1989).

Some prior empirical research has indicated a positive association between greater gender and ethnic diversity on a board and firm performance (Kesner, 1988; Bilimoria and Piderit, 1994). Questions, however, surround the applicability of these findings in the Information Age. That is, prior research defined firm performance using accounting- or market-based measures, or a combination of both (Dalton, Daily, Johnson and Ellstrand, 1999). Such measures of performance focus solely primarily on physical capital (Bontis, 2000). As IC is now the pivotal factor underlying a firm's future wealth-creation potential and survivability, research should utilize measures based on this concept and not physical capital (Roos, Roos, Dragonetti and Edvinsson, 1997). Another deficiency of the vast bulk of previous research is that it used data drawn largely from developed economies, particularly the United States (see, for example, Hermalin and Weisbach, 1991; Klein, 1996). Globalization, however, has increased the importance of other economies. Recent studies have shown the regulatory framework, economic conditions, capital market strength and existing governance structure in different nations may have contrasting affects on the association between a board of directors' demographic features and a firm's performance (Vafeas and Theodorou, 1998). Research on the affect of corporate governance features on firm performance in alternative economies, particularly in transitional economies, is imperative to develop a full understanding of the impact and value of governance structures across broader environmental expanses.

To the knowledge of the authors, empirical research has yet to examine the potential relationship between board of directors' gender and ethnic diversity and a firm's IC performance. This study addresses deficiencies in the literature by analyzing the aforementioned associations using an investigation of eighty-four firms listed on the Johannesburg Stock Exchange. Initial empirical tests indicated a positive association between the percentage of female and non-white directors on the boards of South African publicly listed firms and IC performance. These tests, however, ignored the possible moderating influence of a director's designation as an insider or an outsider. Tests addressing this possible moderating factor found that as the percentage of inside female directors increased a firm's IC performance declined. Conversely, as the percentage of outside female and non-white directors on a board increased a firm's IC performance improved. Finally, there was no significant association between the percentage of inside non-white directors on a board and a firm's IC performance. Overall, empirical findings support the

general tenants of resource dependence theory, the underlying conceptual framework of this study.

Findings from this study should interest policymakers, managers, shareholder, relevant stakeholder groups and researchers in South Africa and internationally. The current understanding of corporate governance is enhanced and broadened by the results of this study. For example, findings illustrate the impact of governance structures in a different business environment. Also, findings provide the initial evidence of the affect of board composition characteristics on a firm's IC performance. These findings enhance the current understanding of corporate strategies and policies that can be used to increase a firm's effective management of its IC.

The remainder of this paper is organized as follows. The next section provides a brief review of IC, the underlying conceptual framework and development of testable propositions. The research method is then discussed followed by an outline of empirical results. The final section discusses the empirical results, concluding remarks and ideas for future research.

2. IC, Underlying Theoretical Perspective and Development of Propositions

Overview of IC: Its Definition, Components and Measurement

The phrase IC has its origins from the end of the 1960's (Sullivan, 2000). It was not until the start of the 1990s, however, that the concept of IC gained wider use (Bontis, 2000). At the start of the new millennium IC is widely recognized as the pivot factor underlying a firm's future wealth-creation and survivability. As a research discipline, the study of IC is still within its infancy. In general, IC research has followed two major avenues of investigation. One stream has sought to define and describe this discipline. As yet, a generally accepted definition of IC remained elusive. Initial definitions perceived IC to be synonymous with intangible assets. Klein and Prusak (as quoted in Brooking, 1996, p.12), for example, defined IC as "material that has been formalized, captured, and leveraged to produce a higher-valued asset." Similarly, Brookings (1996, p.12) stated IC was "given to the combined intangible assets which enable the company to function." Recent definitions have attempted to broaden the concept of IC to reflect a broader essence. Stewart (1997, p. 67), for example, defined IC as "packaged useful knowledge" (see endnote 1).

Components of IC have been debated in the literature with a variety of models having emerged. IC experts, however, generally recognize three major underlying components: (1) human resource capital; (2) structural capital; and (3) customer capital (see endnote 2). Of these, human resource capital is usually distinguished as the most significant driver of

IC value creation. A Danish Trade and Industry Development Council Taskforce (1996), for example, stated the pivotal strategy in developing a firm's IC base revolved around the effective arrangement of its structural capital around its human resources. Pulic (2000, p.2) also wrote a firm's future is now tied "to knowledge and it is the ability of these employees to transform it into profitable action." He (Pulic, 1998, p.8) further stated that in a "knowledge based economy the responsible party for the achieved market results are definitely the employees."

The second major avenue of IC research focuses on developing performance measures (Guthrie and Petty, 2000). Traditional measures (see endnote 3) have been criticized for their inability to adequately measure a firm's performance in the Information Age (see, for example, Kaplan and Norton, 1992; Roos et al., 1997; Pulic and Bornemann, 1998; Sveiby, 2001). For example, traditional measures have been criticized for being too narrow in nature, measuring a firm's performance in terms of only its physical capital (Pulic, 1998). In contrast, IC (see endnote 4) measures have attempted to capture performance with respect to a firm's complete capital structure; that is, physical and IC.

Measures of IC performance can be classified into five major groups: (1) direct IC methods (DIC) (see endnote 5); (2) market capitalization methods (MC) (see endnote 6); (3) output oriented-process methods (OOP); (4) return on assets methods (ROA) (see endnote 7) (Luthy, 1998; Williams, 2000; Sveiby, 2001). The literature describes various advantages and disadvantages associated with each major group. For example, DIC and SC measures provide a more comprehensive perception of a firm's IC performance than predominantly financial metric MC and ROA approaches (Sveiby, 2001). Measures synonymous with DIC and SC methods, however, are generally customized to reflect the nature of each individual firm making comparability difficult (Williams, 2000; Sveiby, 2001). The aim of this paper is not to rectify the conceptual, epistemological and methodological differences between the respective measures of IC performance (see endnote 8). The approach used in this paper to measure IC performance and justification for selecting this approach is described below.

Relationship of Resource-Dependence Theory to IC

Emergence of IC has further intensified the discontent with the traditional product-based (or competitive advantage) view of a firm (Sullivan, 2000; Hoque, Mia and Amal, 2001). In the Information Age emerged alternative views have developed. A prominent alternative capturing the ideals of IC is resource-dependence theory (see, for example, Barney, 1986, 1991; Connor, 1991; Grant, 1991). Resource-dependence theorists view firms as

a bundle of unique resources (Collis and Montgomery, 1995). Social exchange and the efficient use of resources are the driving forces for establishing a competitive advantage and improved performance (Barney, 1991). Factors synonymous with IC are increasingly recognized as the driving force behind a firm establishing a competitive advantage. Teece (2000, p.35), for example, wrote that a firm's pursuit of competitive advantage "flows from the creation, ownership, protection and use of difficult-to-imitate commercial and industrial knowledge assets."

Resource-dependence theorists argue a firm responds to, and becomes dependent upon actors, organizations or other firms that control resources critical to operations, and over which the firm has limited control (see, for example, Barney, 1991; Collis and Montgomery, 1995; Shrivastava, 1995a). Under these circumstances, a firm is motivated to undertake action to minimize any potential loss in power due to the reliance on others for resources (Pfeffer and Salancik, 1978; Prahalad and Hamel, 1994). By accumulating and gaining control over the unique, or difficult to duplicate, resources it requires, a firm can establish a competitive advantage (Barney, 1991). It is argued the accumulation and access to resources is established via alliances and coalitions that may take considerable time (Provan, 1980; Johnson, Daily and Ellstrand, 1996). Resource-dependence theorists consequently view a firm's resources as being somewhat 'sticky' such that they cannot be readily added or discarded (Grant, 1991). As a result, in at least the short run, firms must operate and exploit the resources it already has accumulated. Consistent with views expressed in the IC literature, resource-dependence theorists view human resources as the most important firm-level resource required for establishing a competitive advantage (Zahra and Pearce, 1989). Skills, knowledge and capabilities of human resources are perhaps the most sustainable and renewable of assets to a firm, but generally extremely difficult to imitate (Grant, 1991). Control of human resource attributes remains in the hands of individual employees. A firm, therefore, is highly susceptible to human resource movements (Shrivastava, 1995b). For instance, if key employees moved to another firm, essential knowledge, skills and capabilities are also transferred. In a worse case scenario, the transfer can significantly reduce a firm's competitive advantage. In the Information Age it is imperative a firm establish strong coalitions with its human resources so as preserve and exploit more effectively the skills, knowledge and capabilities of this resource.

Diversity on a Firm's Board of Directors: The Mix of Gender and Ethnic Backgrounds

Resource-dependence theorists and IC analysts argue that all facets of human resources need to be fully

utilized (see, for example, Barney, 1991; Grant, 1991; Pulic, 1998; Sveiby, 2000, 2001). This will best enable a firm to increase its performance and wealth-creation potential. Diversification of a firm's human resource structure, with regard to its gender and ethnic mix, is often viewed as a necessary requirement to optimize this essential resource (Siciliano, 1996). Human resource diversity provides a variety of advantages. Iles and Auluck (1993), for example, suggested a diversified workforce facilitates greater problem solving skills and synergy. Katzenbach and Associates (1995) argued diversity promotes wider creativity and flexibility that enables a firm to adjust more rapidly to the changing and dynamic business environment. In particular, corporate governance researchers regularly suggest a diversified and well-balanced board of directors can significantly enhance a firm's performance (see, for example, Agrawal and Knoeber, 1996; Williams and O'Reilly, 1997; Buck, Filatitchev and Wright, 1998).

Resource-dependence and corporate governance theorists recognize a board of directors as an essential mechanism that can enhance and create the coalitions with the stakeholders controlling resources required by a firm (Westphal and Milton, 2000). Each director brings a collection of unique and different experiences, attachments and points of view to a board (Wang and Dewhirst, 1992). If members' perceptions, views and backgrounds are relatively homogenous in nature there is a higher likelihood decision-making strategies of this corporate governance mechanism will be single-minded, predictable and inflexible (Westphal and Zajac, 1998). Boards with a more diversified mix of members with better enable it to address the challenges of an uncertain and dynamic business environment (Daily, Certo and Dalton, 1999; Gilbert and Ivancevich, 2000).

From the literature a variety of reasons can be suggested to support how greater gender and ethnic diversity can enhance a board's influence on a firm's performance with respect to IC. For example, dissimilarities in the gender and ethnic backgrounds of directors can contribute different sociological perceptions and understandings to the decision-making process (Coffey and Wang, 1998). As a result, a board is better able to instigate more comprehensive policies, strategies, activities and projects (Cox and Blake, 1991). Greater gender and ethnic diversity also enhances the board's flexibility in its decision-making process due to a wider set of perceptions and views (Gilbert and Ivancevich, 2000). This will enable a firm to better facilitate strategic change (Wiersema and Bantel, 1992). Consequently, a firm will be able to respond more rapidly to changes in the dynamic and uncertain business environment of the Information Age.

In the context of human resources, Cox and Blake (1991) suggested increased gender and ethnic diversity on a board of directors enhances a firm's

ability to compete for skilled employees in the labour market. Consequently, firm IC performance will be promoted. A more diversified board will be better able to develop well-rounded recruiting policies and strategies, and working conditions attractive to a broader spectrum of potential employees and exploit its existing human resource capital (Powell, 1990; Shrader, Blackburn and Iles, 1997). Diversity is thought to intensify the sensitivity of a board to requirements of the workforce, thereby, enabling it to increase the capacity to instigate work practice initiatives addressing the needs of its employees and employee pressure groups such as unions (Shrader, Hoffman and Stearns, 1991). Also, diversification enables a board and firm to react more readily to changing workforce conditions, including those of a sensitive nature such sexual harassment (Daum, 1998; Westphal and Zajac, 1998; Gilbert and Ivancevich, 2000). Overall, a diversified board of directors enables a firm to create alliances and coalitions with a broader spectrum of human resources. Hence, a greater range of knowledge, skills and capabilities can be accumulated and exploited, thereby increasing a firm's IC potential.

Greater board diversity can also improve a firm's IC performance through its influence over other components of this concept such as that related to consumers. With developments in information technology and increased globalization the consumer base of many firms have widened (Stewart, 1997). Firms best able to encapsulate this expanded consumer base will gain a considerable competitive advantage (Luthy, 1998). A diversified board of directors will enable a firm to generate broader initiatives, such as advertising and consumer policies, demonstrating greater imagination and sensitivity (Bilimoria and Piderit, 1994). These broader initiatives will hopefully appeal to the wider consumer audience enabling the firm to establish and sustain relationships with customers (Pfeffer and Salancik, 1978; Wang and Dewhirst, 1992; Young, Stedham and Beekun, 2000). Further, as customers' tastes change, firms having greater flexibility in their decision-making structure will be better able to make rapid adjustments to maintain or improve its position (Moscovici and Faucheux, 1972; Nemeth, 1986; Laughlin, 1992). A diversified board enhances flexibility (McGrath, 1984; Hitt and Tyler, 1991).

Overview of Prior Empirical Findings

Normative studies have suggested a positive association between increased gender and ethnic diversity on a board of directors and firm performance. Empirical findings, however, are somewhat mixed (see, for example, Kesner, 1988; Shrader et al., 1991; Bilimoria and Piderit, 1994; Shrader et al., 1997). Early research failed to find a significant association between a board's level of gender diversity and a firm's physical performance (see, for example, Babchuk, Marsey and Gordon,

1960; Zald, 1969). The lack of association was attributed to the business environment of the time, a period not conducive to women in the workforce. Despite changes in the business environment, results continue to vary. Provan (1980), Kesner (1988) and Shrader et al., (1991), for example, found that as the percentage of women on a board increased, firm performance was enhanced. Research by Zahra and Stanton (1988), Bilimoria and Piderit (1994) and Shrader et al., (1997), however, did not support this association.

With respect to ethnic diversity, a positive association between this feature of board composition and firm performance has been supported by some empirical studies (see, for example, McGrath, 1984; Nemeth, 1986; Bantel and Jackson, 1989; Hitt and Tyler, 1991; Williams and O'Reilly, 1997; Crano and Chen, 1998). Other related empirical research has supported the proposition that an increased ethnic mix stimulates wider intellectual thinking and imagination in the decision-making process of a board, thereby enhancing a firm's performance (see, for example, Moscovici and Faucheux, 1972; Nemeth, 1986; Laughlin, 1992). Some other empirical research, however, has found contrasting results (see, for example, Jackson, Stone and Alvarez, 1992; O'Reilly, Williams and Barsade, 1997). Using the tenants of self-categorization theory the lack of an association is attributed to those from a majority ethnic group classify minorities as outsiders (Westphal and Milton, 2000). As a result, the contributions and suggestions of minority group board members are ignored (see, for example, Tajfel, Sheikh and Gardner, 1964; Mackie, 1987; Miller and Brewer, 1996; Erb, Bohner, Schmaizie and Rank, 1998).

Prior normative and empirical studies, including those based on resource-dependence theory, have indicated a director's designation as an insider may moderate the association between gender and ethnic diversity on a board of directors and firm performance (see, for example, Pfeffer and Salancik, 1978; Wang and Dewhirst, 1992; Young et al, 2000). Inside directors are viewed to be dependent on the firm for their principal employment or financial security. Due to this relationship, inside directors will favour decisions that enhance their self-interests. This decision-making process will favour the acceptance of projects that emphasize short-term financial goals and those having less risk attached. Such projects, however, will not enhance IC performance. That is, the IC literature frequently recognizes the development of this form of business capital requires the establishment of long-term strategies and policies.

Testable Propositions

From the above discussion, the overarching proposition is that greater gender and ethnic diversity on the boards of directors of South African publicly

listed firms were better placed to acquire the key resources underlying IC. Consequently, their IC performance is enhanced. Influence of gender and ethnic diversity on IC performance, however, will be moderated by a director's designation as an insider/outsider. The following testable propositions are, therefore, formed:

Proposition 1a: There is a positive association between the percentage of female directors on the board of directors of South African publicly listed firms and the level of IC performance.

Proposition 1b: There is a negative association between the percentage of female inside directors on the board of directors of South African publicly listed firms and the level of IC performance.

Proposition 2a: There is a positive association between the percentage of non-white directors on the board of directors of South African publicly listed firms and the level of IC performance.

Proposition 2b: There is a negative association between the percentage of non-white inside directors on the board of directors of South African publicly listed firms and the level of IC performance.

3. The Research Method, Data and Model Selection of Nation and the Sample Data

Several major reasons support the selection of South Africa. First, South Africa is a transitional economy of increasing importance in the world business environment, particularly in the African region (Klein, 1999). Second, following the removal of apartheid, the South African business environment has undergone sizeable adjustments that have lead to considerable uncertainty (Maharaj, 1999; Shunmaugan, 1999). South African directors and management, therefore, are under greater pressure to develop appropriate practices to meet the challenges of this uncertain business environment. Another reason for selecting South Africa stems from the extensive encouragement of the South African government for greater participation of women in the general workforce and the promotion of non-whites to higher positions of management (Central Statistics, 1998; Minister of Labour, 1998). South African firms, therefore, face more pressure to modify strategies and policies to address the regulatory provisions of new government acts and directives. Finally, the South African government strongly recognized that if the national infrastructure was to develop beyond its status as a transitional economy, there was a need to base its development on IC rather than physical capabilities (Klein, 1999; Barricentos, McClenaghan, and Orton, 2000). As a result of the initiatives of the South African government to promote the development of IC, it is reasonable to expect South Africa business leaders to be familiar with and have potentially instigated action to enhance the IC of a firm.

Data for this study was directly obtained from a firm's annual report, a returned questionnaire and several related databases. Information was drawn from each annual report to compute a firm's IC performance, establish board composition characteristics and measure control variables. The questionnaire enabled the capture of information on a firm's board of directors not found in their annual report or from other alternative sources (see endnote 9). Databases were used to reconfirm data collected from a firm's annual report and returned questionnaire such as board composition features.

Due to difficulties in acquiring information from private firms, the initial sample population comprised all 751 firms listed on the Johannesburg Stock Exchange at the end December 31, 2001. One hundred and twenty eight firms were excluded because "regulation masks efficiency differences across firms, potentially rendering governance mechanisms less important" (Vafeas and Theodorou, 1998, p.391). A survey sample of one hundred and twenty publicly listed firms was then randomly selected.

Following the random selection of one hundred and twenty firms, a letter and questionnaire was sent to their headquarters. The letter requested the latest annual report published prior to December 31, 2001. After a period of eight weeks, a follow-up letter and questionnaire was sent to those firms not replying to the initial request. From the initial request sixty-nine annual reports and questionnaires were received. A further twenty-six annual reports and questionnaire were received from the follow-up letter. Non-response bias tests showed no significant variations. (see endnote 10). Of the ninety-five firms returning requested documentation, twenty-one were excluded. Seven firms were removed as they were found to be subsidiaries of large foreign multinational firms based in the United States and United Kingdom. This exclusion was done to minimize possible extraneous external influences. Documentation from the remaining four firms was found to be incomplete.

Measure of Dependent Variable - IC Performance

As noted above, there is no universal agreement of an appropriate measure of IC. To determine an appropriate measure of IC performance to be used in this study from methods described in the literature a screening criterion was developed. This criterion was developed with consideration for such circumstances as the study's research objectives and question, data availability and underlying conceptual framework. The literature supports the respective features of the screening criterion (see, for example, Luthy, 1998; Schneider, 1999; Guthrie and Petty, 2000; Petty and Guthrie, 2000; Sveiby, 2001). The screening criterion is defined as follows:

- (a) Measure is consistent with the underlying tenants of resource-dependence theory; that is,

firm viewed as a bundle of resources with a particular emphasis on human resources.

- (b) The approach is based on a firm's total capital structure and major individual components of IC.
- (c) The measure utilized conventional accounting techniques, thereby, increasingly the reliability of the measure as calculation uses audited data.
- (d) The technique can be consistently and readily applied to various firm structures ensuring comparability of measured performance.
- (e) It enables the collection of evidence of IC leverage to key success processes.
- (f) The measure can be calculated and used by both internal and external stakeholders, such as management, investors and pressure groups.
- (g) The methodology used is relatively straightforward enabling greater cognitive understanding.

After reviewing various measures of IC proposed in the literature, data availability and the study's research objectives, the *Value Added Intellectual Coefficient (VAICTM)* methodology developed by Ante Pulic (1998) was determined to be most applicable proxy the purposes of this study. This methodology demonstrated all of the aspects of the screening criterion defined above. Further, there is strong support for the validity and application of this measure in the literature (see, for example, Pulic and Bornemann, 1999; Schneider, 1999; Williams, 2000).

VAICTM is an output oriented-process methodology that can be applied across different business forms and at various levels of operation (Pulic and Bornemann, 1999). This methodology is considered a "universal indicator showing the intellectual abilities of a business unit's value creation ability and represents a measure of business efficiency in the knowledge based economy" (Pulic, 1998, p.3). Algebraically, *VAICTM* is the total sum of the value creation efficiency a business unit's physical capital and two major components of IC (namely human resource and structural capital). Designed to provide an indication of a business unit's IC efficiency, the higher the *VAICTM* value the better a business unit's management has utilized the potential value creation from the available physical capital and IC.

Several major underlying assumptions encompass the *VAICTM* methodology. First, it assumes that in the Information Age a measure of a performance is defined by firm's value creation, or output. Pulic's (1998) methodology focuses on value creation, value creators and value creation activities. This contrasts to traditional measures that define performance in terms of inputs (Schneider, 1999). *VAICTM* views a firm as a dynamic system of highly connected and interactive relations, highly sensitive to external inputs. That is, a firm is a system that seeks to create

additional value above its inputs (Pulic, 1998). A firm generates value creation by establishing alliances and coalitions with the various required resources and value creators (employees, the social environment (society, community) customers, suppliers, investors and government). Finally, employees are perceived as the major resource group driving a firm's value creation, an assumption consistent with resource-dependence theory and views expressed in the IC literature (see, for example, Pulic, 1998; Pulic and Bornemann, 1999).

In computing *VAICTM* values for each South African publicly listed firm included in this study, information was directed obtained from the latest annual report published prior to December 31, 2001. The five major steps used to calculate *VAICTM* values are described in detail in Appendix A.

Measure of Independent Variables

Consistent with prior research (see, for example, Coffey and Wang, 1998), gender diversity (*PerGender*) is measured as the percentage of female representation on the board of directors of each South African publicly listed firm at the time their latest annual report prior to December 31, 2001 was published. Two steps were involved in the development of a proxy measure of ethnic diversity. The first step involved directors being classified as being either white or non-white. This categorization is consistent with recent South African government and legislative definitions of the major ethnic groups in this nation. For example, the Employment Equity Bill defines South Africa citizens as being either white or black (non-white) (Minister of Labour, 1998). According to this bill, "black (non-white) people" were defined as a "generic term describing Africans, Coloureds and Indians." Following this dichotomous classification, ethnic diversity (*PerEthnic*) was measured as the percentage of non-white representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

To analyze the affect of a director's insider/outsider designation on the association between a board of directors' gender and ethnic diversity, and firm's IC performance, insiders were defined as those directly employed by the firm, or individuals with likely professional ties (such as lawyers, accountants and consultants) with the firm. This definition is consistent with prior research (see, for example, Vance, 1955, 1964; Mallette and Fowler, 1992; Young, Stedham and Beekun, 2000). From this distinction the following four proxy measures are formed:

- (a) *InsidePerGender*: Percentage of inside female representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.
- (b) *OutsidePerGender*: Percentage of outside female representation on the board of

directors at the time the latest annual report prior to December 31, 2001 was published.

- (c) *InsidePerEthnic*: Percentage of inside non-white representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.
- (d) *OutsidePerEthnic*: Percentage of outside non-white representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

Measure of Control Factors

To test *Propositions 1a, 1b, 2a and 2b* multiple regression analysis was used. Each multiple regression model tested included five control factors (leverage; dividend yield; firm size; industry influence; and ownership concentration) drawn from a review of prior corporate governance literature (see, for example, Dalton and Kesner, 1985; Daily and Dalton, 1992; Hill and Jones, 1992; Vafeas and Afxentiou, 1998). Proxy measures for each control factor, and predicted direction of the relationship with *VAICTM*, are briefly described as follows:

- (1) *Leverage (Lev)*: - total debt divided by total shareholders' equity as reported in each firm's annual report; negative relationship to dependent variable.
- (2) *Dividend Yield (DivYield)*: - percentage of cash dividends paid during 2001 divided by total shareholders' equity; positive relationship to dependent variable.
- (3) *Firm Size (Size)*: - natural log of annual sales as reported in each firm's annual report; positive relationship to dependent variable.
- (4) *R&D Sensitivity (R&DSen)*: - dummy variable with firm's determined to be research and development intensive (see endnote 11) coded a one (1), otherwise coded a zero (0) (Wruck, 1993; Sanders and Carpenter, 1998); positive relationship to dependent variable.
- (5) *Ownership Concentration (OwnerCon)*: - percentage of outstanding shares owned by the firm's major shareholders divided the company's total number of outstanding shares. A firm's major shareholder was defined as a shareholder holding more than 5% of the company's total outstanding shares; negative relationship to dependent variable.

4. Results

Table 1 reports the descriptive statistics. With respect to board of director characteristics, the average number of directors is higher amongst South African publicly listed firms than in developed nations such as the United States and United Kingdom (see, for example, Main and Johnson, 1993; Conyon and

Mallin, 1997; Dalton et al., 1999). Also, the mean percentage of inside director representation was slightly higher than recent studies in developed nations (see, for example, Finkelstein and Hambrick, 1996; Johnson et al., 1996). Share ownership amongst directors of South African publicly listed firms is comparable to levels reported in other nations (Vafas and Theodorou, 1998). Finally, the mean *VAIC*TM value is comparable to other studies (see, for example, Pulic, 1998; Williams, 2001).

{Insert Table 1 About Here}

Table 2 provides a breakdown of the composition of gender and ethnic diversity on the boards of directors of South African publicly listed firms. The percentage of publicly listed firms in South Africa without any female representation on their board of directors was higher than that reported in developed nations (see, for example, Daum, 1998; Daily et al., 1999). Of South African publicly listed firms with female directors, representation was generally: (a) limited to only one or two directorships; and (b) were predominantly designated as outsiders. These findings are consistent with those reported in other nations (see, for example, Daum, 1998; Daily et al., 1999). Finally, results indicated that as the absolute number of female directors on a board increased the mean *VAIC*TM values also improved.

{Insert Table 2 About Here}

As for the percentage of South African publicly listed firms having one or more non-white directors on their board of directors, values reported in Table 2 were comparable to findings in other nations. This result is not unexpected given the ethnic mix in South Africa and intensive governmental efforts to promote greater non-white representation in the management of publicly listed companies. With respect to mean *VAIC*TM values, there was not obvious positive or negative trend as the absolute number of non-white directors on the board of South African publicly listed firms increased. It is noted, however, that the mean *VAIC*TM value for firms with three or more non-white directors was considerably higher than firms with an all white board.

Independent Student *t*-test findings in Table 3 Panel A show the mean *VAIC*TM value of South African publicly listed firms with female representation on their board was significantly greater than counterparts without such representation. Similarly, the mean *VAIC*TM value of South African publicly listed firms with non-white directors was significantly greater than those without (see Table 3 Panel B).

{Insert Table 3 About Here}

Results of three multiple regression models (see endnote 12) to test *Propositions 1a* and *2a* are

reported in Table 4. Two models separately tested the association between each independent and dependent variables (Table 4 Panel A and B). The third model included both two independent variables simultaneously (Table 4 Panel C). The *f*-value for each model was significant at the 1% level. Explanatory power ranged from a high of 48.1 percent (Table 4 Panel A) to a low of 32.5 percent (Table 4 Panel B). Coefficients representing *PerGender* ($p < 0.001$; see Table 4 Panels A and C) and *PerEthnic* ($p < 0.05$; see Table 4 Panels B and C) were statistically significant Directional signs of all these coefficients were as predicted.

{Insert Table 4 About Here}

Three further multiple regression models tested *Propositions 1b* and *2b* (see Table 5). Each model was highly significant ($p < 0.001$) with the explanatory power of each model ranging from a high of 55.3 percent (Table 5 Panel A) to a low of 36.4 (Table 5 Panel B) percent. All coefficients representing *InsidePerGender*, *OutsidePerGender* and *OutsidePerEthnic* were statistically significant ($p < 0.05$, $0 < 0.001$ and $p < 0.10$ respectively). Directional signs for these coefficients were as predicted. In contrast, the coefficients for *InsidePerEthnic* were not statistically significant in either model that included this independent variable (Table 5 Panel B and C). Also, the directional sign of the coefficients related to *InsidePerEthnic* were not as predicted.

{Insert Table 5 About Here}

Coefficients representing four of the five control factors (*Lev*, *DivYield*, *R&DSen* and *OwnerCon*) were statistically significant in all the multiple regression models tested (see Tables 4 and 5). Statistical significance of these coefficients, however, did vary across each multiple regressions. Coefficients for the remaining control factor, *Size*, were not statistically significant in any of the multiple regression models tested. The directional signs for all coefficients related to the control factors were as predicted in each multiple regression conducted (see Tables 4 and 5).

5. Discussion and Conclusions

Discussion of Results

Based on univariate and multivariate analysis it is concluded there is a strong positive association between the percentage of female directors on the boards of South African publicly listed firms and IC performance. Empirical findings also showed that as the percentage of non-white directors on the boards of South African publicly increased, IC performance also improved. It is conclusion of this study, therefore, that the empirical results support the

acceptance of *Proposition 1a* and *Proposition 2a*. These empirical findings are consistent with some prior research of the affect of a board of directors' gender and ethnic diversity on a firm's performance (Provan, 1980; Kesner, 1988; Shrader et al., 1991). Results from this study, however, expand earlier findings. Prior research showed the two aforementioned characteristics of board composition affected a firm's physical capital performance. This study demonstrated the influence of gender and ethnic diversity of a board of directors extends to encompass a firm's IC performance. This result is of importance because IC is now the underlying factor of a firm's wealth-creation and survivability.

Aside from examining the direct association between a board of directors' gender and ethnic diversity and a firm's IC performance, additional empirical research attempted to determine the possible moderating affects of a directors' inside/outside designation. With respect to gender diversity, empirical findings indicated that as the percentage of inside female representation on the boards of directors of South African publicly listed firms increased, this had a negative impact on IC performance. Consider, outside designation had a positive influence on the dependent variable. It is concluded, based on these results, that *Proposition 1b* is supported. As with female directors, designation of non-white directors as outsiders also had a positive influence on IC performance. Conversely, there was no significant association between the percentage of inside non-white directors and IC performance. Consequence *Proposition 2b* is rejected.

Failure of empirical findings to support *Proposition 2b* was not consistent with findings in prior studies. Self-categorization theory and the South African social infrastructure may assist in explaining this discrepancy. Proponents of self-categorization theory argue individuals construct social identities to classify themselves and others into social categories based on salient demographic features such as ethnic background (see, for example, Jackson et al., 1992; O'Reilly et al., 1997). Despite the removal of apartheid social animosities from that period are still likely to exist in South Africa's social infrastructure. White and non-white directors, therefore, may categorize themselves with other members of the board that share the same ethnic background due to a shared social commonality. Consequently, decisions of non-white directors may be influenced more by their social connection to directors of a similar ethnic background than their designation as an inside representative.

Finally, empirical findings related to four of the five control variables (leverage, dividend yield, research and development sensitivity and ownership concentration) were consistent with previous results reported in the corporate governance literature (Dalton and Kesner, 1985; Daily and Dalton, 1992; Hill and Jones, 1992; Vafeas and Afxentiou, 1998; Vafas and Theodorou, 1998). Two speculative

reasons are offered to explain the lack of an association between firm size and IC performance. First, the largest firms in South African are predominantly traditional in nature (that is, being manufacturing and mining firms) driven essentially physical capital (Central Statistics, 1998; Klein, 1999). Directors of such firms, therefore, may lack experience in IC management, or have an incentive to improve this aspect of a firm's capital structure. Second, IC is a discipline still within its infancy. Directors and management of larger firms may yet have sufficient understanding of this concept and the threat of poor IC performance to the firm. The incentive to focus on management techniques to enhance IC performance, therefore, may be lacking.

Concluding Remarks and Future Research Ideas

This study broke with prior corporate governance and IC research in two major ways. First, to the knowledge of the author, this study provided the first empirical analysis of the association between board of director composition characteristics (gender and ethnic diversity) and a firm's IC performance. Prior research has examined the affect of such board of director composition characteristics on firm performance but in terms of physical capital or social accomplishment. Second, this study analyzed the affect of a board of directors' gender and ethnic diversity on a firm's IC performance in a transitional economy. Prior studies have virtually limited such analysis to developed nations, predominantly the United States.

Based on the empirical findings reported in this study it is recommended South African publicly listed firms attempt to construct a more balanced board of directors in terms of its gender and ethnic diversity. This balanced board structure will enable a firm to better establish coalitions with a wider set of required resources. By utilizing the skills, knowledge and capabilities of a broader resource base a firm will be able to enhance its IC performance. Thus, future wealth-creation potential and survivability is optimized. From a theoretical perspective, the results of this study support the application of resource-dependence theory as a relevant conceptual framework for examining and explaining factors affecting IC performance. Also, results suggest that in the Information Age, the traditional product-based perception of a firm in South Africa may no longer be applicable.

Findings from this study provided various contributions to the corporate governance and IC literature. For example, this study expanded prior research of the association between firm performance and a board of directors' gender and ethnic diversity defining performance within a new context; that is, a firm's IC performance. Further, this study provided one of the first empirical tests of the association between a board of directors' gender and ethnic

diversity and firm performance in a transitional economy. This expands the understanding of the impact of corporate governance structures on firm performance under different environmental conditions. Overall, findings should interest a wide spectrum of internal and external stakeholders including company management, regulators, special interest groups and academic researchers.

Apart from provide various insights, this study provides a valuable starting point for future research. For example, analysis in this study was cross-sectional. A longitudinal study should be undertaken to determine if the associations identified in this paper hold over time. Second, this study only considered the relationship between two boards of directors' composition characteristics and IC performance. Other board of director composition characteristics, such as overall board size, occupational experience of the directors or the age of the directors, can also be investigated for their impact on a firm's intellectual capital performance. Finally, this project examined the noted associations in an isolated corporate governance setting. Vafeas and Theodorou (1998, p. 403) argued the examination of corporate governance structures in isolation "may lead to spurious relationships and misguided conclusions." In future studies, the associations analyzed in this research study should be examined in nations with different corporate governance structures, such as Japan or Sweden.

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Endnotes

¹ It is not the purpose of this study to rectify the differences in definitions underlying IC. For the purposes of this study the definition derived by the OECD (2000) is used. The OECD (2000) defined IC as the "economic value of two categories of intangible assets of a company: (1) organizational (structural) capital; and (2) human capital." There is support in the literature for the use of this definition (Petty and Guthrie, 2000). Further, this definition is consistent with the measure of IC performance used on this study.

² Customer capital is often shown as sub-component of structural capital in many models.

³ Traditional performance measures utilize financial criteria, such as the return on tangible assets or equity (Hoque, Mia and Alam, 2001). These measures are viewed as being too narrow in focus, considering a firm's performance in terms of only its physical capital (Kaplan and Norton, 1992, 1993; Otley, 1999). Such measures have also been criticized for their historical nature or being incomplete in their focus (Ittner and Larcker, 1998). Empirical research findings have supported these concerns (Abernethy and Lillis, 1995).

⁴ Use of the phrase 'IC performance' implies such measures attempt to gauge the firm's performance of this component of a firm's capital structure; this is a misconception. It is important to note IC performance measures attempt to measure firm performance based on a firm complete capital structure; that is, both its physical and IC.

⁵ Methods under this approach identified respective components of IC from which point monetary values were then established.

⁶ Measures in the category attempt to derive an estimate of the value of a company's IC by reference to its return on tangible assets.

⁷ Similar to *Direct Intellectual Capital Methods*, approaches under the *Scorecard Method* distinguished

various components of IC for which a number of indicators and indices are generated. These are then reported in a scorecard format or on graphs.

⁸ For a full review of these issues see Luthy (1998), Bontis (2000), Williams (2000) and Sveiby (2001).

⁹ A database from the Bureau of Financial Analysis operated by the University of Pretoria, for example, provided some information about directors of South African publicly listed companies. Such information was limited in its focus and often highly aggregated. As such, this information was helpful in filling some of the information points of this study but left many areas unanswered.

¹⁰ Two batches of means tests were conducted to examine for non-response bias. The first set examined for any significant differences between specific factors known about the firms that supplied their annual reports and those failing to respond to the request letters. The second set of tests sought to establish if there were any significant differences between known characteristics of companies that responded early to the first request for their annual report compared to those firms that provided their annual report near the arbitrary cut-off date applied in this study for the return of annual reports. Statistical tests did not indicate any significant differences implying the lack of any non-response bias.

¹¹ A firm was defined as being research and development sensitive if it separately disclosed the amount of research and development expense in their annual report.

¹² Prior to conducting multiple regression tests Pearson product-moment correlation coefficients were computed to determine the correlation between independent variables and control factors. Results did not indicate any serious multicollinearity problems. As no serious problems were noted results of the correlation were not directly reported in the main text of the paper. Pearson product-moment correlation coefficient values, however, can be provided upon request.

¹³ A firm was defined as being research and development sensitive if it separately disclosed the amount of research and development expense in their annual report.

¹⁴ A firm was defined as being research and development sensitive if it separately disclosed the amount of research and development expense in their annual report.

Appendices

Table 1. Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Organizational Characteristics and Control Factors				
Total Assets	R 16,670 mil.	R 38,610 mil	R 39,427 mil.	R 191,000 mil.
Sales Turnover	R 8,350 mil	R 10,530 mil	R 40,010 mil.	R 46,500 mil.
Market Capitalization	R 6,530 mil	R 13,380 mil	R 6,146 mil	R 54,500 mil
Majority Shareholder	59.98%	20.92%	11.10%	86.21%
Number of Shareholders	4585	5750	500	25,586
Return on Assets	12.65%	6.62%	0.38%	24.87%
Total Debt / Total Assets	54.25%	21.96%	12.63%	95.11%
Cash Dividends / Shareholder's Equity	3.83%	5.41%	0.00%	25.88%
Director Features				
Total Number of Directors on the Board	13.00	5.34	5.00	29.00
Number Inside Directors on the Board	6.28	3.36	2.00	14.00
Number Outside Directors on the Board	6.71	3.08	1.00	15.00
Shares Owned by Directors	29,019,771	70,689,606	13,000	370,000,000
Shares Owned by Inside Directors	23,875,814	59,336,263	12,000	30,500,000
Shares Owned by Outside Directors	51,439,567	12,623,152	1,000	305,000,000
Company Performance				
VAIC™	4.269	2.426	1.961	8.451

Table 2. Frequency of board composition in terms of gender and ethnic background, and IC performance

Category	Number and Percentage of Company in Sample with Number of Directors on Board											
	None of Directors Meeting Feature			One Director Meeting Feature			Two Directors Meeting Feature			Three or More Directors Meeting Feature		
	#	%	Mean VAIC™	#	%	Mean VAIC™	#	%	Mean VAIC™	#	%	Mean VAIC™
Number of Companies – Female Directors	45	53.6	3.460	27	32.1	4.026	9	10.7	7.654	3	3.6	8.462
Number of Companies - Executive Female Directors	75	89.3	4.188	9	10.7	4.948	0	0.0	0.000	0	0.0	0.000
Number of Companies - Independent Female Directors	48	57.1	3.520	27	32.1	4.818	9	10.7	6.625	0	0.0	0.000
Number of Companies - Non-White Directors	30	35.7	3.330	15	17.9	4.464	24	28.6	3.615	15	17.9	7.003
Number of Companies - Executive Non-White Directors	63	75.0	4.098	12	14.3	4.355	6	7.1	5.225	3	3.6	5.625
Number of Companies - Independent Non-White Directors	36	42.9	3.524	15	17.9	4.462	21	25.0	3.902	12	14.3	6.909

Table 3. Univariate results

Panel A – Female Directors versus No Female Directors on Board				
	Female Directors on Board (n=39)	No Female Directors on Board (n=45)	t-statistic	Significance
Mean VAIC TM	5.205	3.460	12.370	0.001*
Std. Dev	3.128	1.123		
Mann-Whitney U z = -4.379; Significance p=0.000*				
Where: * = Significant at p< 0.05; ** = Significant at p<0.10				
Panel B – Non-White Directors versus No Non-White Directors on Board				
	Non-White Directors on Board (n=54)	No Non-White Directors on Board (n=30)	t-statistic	Significance
Mean VAIC TM	4.792	3.330	7.611	0.007*
Std. Dev	2.833	0.891		
Mann-Whitney U z = -2.358; Significance p=0.018*				
Where: * = Significant at p< 0.05; ** = Significant at p<0.10				

Table 4. Multiple regression results of complete sample

Variable	Predicted Sign	Panel A – Model 1		Panel B – Model 2		Panel C – Model 3	
		t-statistic	p-value	t-statistic	p-value	t-statistic	p-value
Director Features							
<i>PerGender</i>	Positive	7.050	0.000*			4.147	0.000*
<i>PerEthnic</i>	Positive			2.762	0.007**	2.992	0.004**
Control Factors							
<i>Lev</i>	Negative	-6.197	0.000*	-3.952	0.000*	3.098	0.003**
<i>DivYield</i>	Positive	2.355	0.021**	2.063	0.043*	2.399	0.017**
<i>Size</i>	Positive	1.063	0.291	0.878	0.383	0.634	0.528
<i>R&DSen</i>	Positive	1.960	0.054***	1.988	0.051***	2.112	0.037**
<i>OwnerCon</i>	Negative	3.495	0.001*	2.387	0.019*	2.503	0.014**
Intercept		0.985	0.328	0.861	0.392	0.799	0.425
Model Summary							
Adjusted R-Squared			0.481		0.325		0.380
F-Statistic			13.814		5.990		8.253
p-value			0.000*		0.000*		0.000*

Where:

* = significant at p<0.001; ** = significant at p<0.05; *** = significant at p<0.10.

Model 1 Equation: $VAIC^{TM} = a_1 + \alpha_1 PerGender - \alpha_2 Lev + \alpha_3 DivYield + \alpha_4 Size + \alpha_5 R\&DSen - \alpha_6 OwnerCon + \epsilon$

Model 2 Equation: $VAIC^{TM} = a_1 + \alpha_1 PerEthnic - \alpha_2 Lev + \alpha_3 DivYield + \alpha_4 Size + \alpha_5 R\&DSen - \alpha_6 OwnerCon + \epsilon$

Model 3 Equation: $VAIC^{TM} = a_1 + \alpha_1 PerGender + \alpha_2 PerEthnic - \alpha_3 Lev + \alpha_4 DivYield + \alpha_5 Size + \alpha_6 R\&DSen - \alpha_7 OwnerCon + \epsilon$

Diversity of Gender on Board of Directors (PerGender): - Percentage of female representation on the board of directors at the time the latest annual report prior to December 31, 1998 was published.

Diversity of Ethnic Groups on Board of Directors (PerEthnic): - Percentage of non-white representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

Leverage (Lev): - total debt divided by total shareholders' equity as reported in each firm's annual report; negative relationship to dependent variable.

Dividend Yield (DivYield): - percentage of cash dividends paid during 2001 divided by total shareholders' equity; positive relationship to dependent variable.

Firm Size (Size): - natural log of annual sales as reported in each firm's annual report; positive relationship to dependent variable.

R&D Sensitivity (R&DSen): - dummy variable with firm's determined to be research and development intensive (see endnote 13) coded a one (1), otherwise coded a zero (0) (technique used in prior research such as Wruck (1993) and Sanders and Carpenter, 1998); positive relationship to dependent variable.

Ownership Concentration (OwnerCon): - percentage of outstanding shares owned by the firm's major shareholders divided the company's total number of outstanding shares. A firm's major shareholder was defined as a shareholder holding more than 5% of the company's total outstanding shares; negative relationship to dependent variable.

Table 5. Multiple regression results of complete sample

Variable	Predicted Sign	Panel A – Model 4		Panel B – Model 5		Panel C – Model 6	
		t-statistic	p-value	t-statistic	p-value	t-statistic	p-value
Director Features							
<i>InsidePerGender</i>	Negative	-1.902	0.063**			-2.505	0.014**
<i>OutsidePerGender</i>	Positive	3.904	0.000*			3.841	0.000*
<i>InsidePerEthnic</i>	Negative			1.409	0.163	1.667	0.100
<i>OutsidePerEthnic</i>	Positive			2.545	0.013**	1.919	0.059***
Control Factors							
<i>Lev</i>	Negative	-6.531	0.000*	-3.879	0.000*	-2.946	0.004**
<i>DivYield</i>	Positive	2.580	0.012**	2.040	0.040**	2.092	0.039**
<i>Size</i>	Positive	0.279	0.781	0.876	0.384	0.472	0.639
<i>R&Dsen</i>	Positive	1.669	0.099***	2.402	0.019**	3.452	0.001*
<i>OwnerCon</i>	Negative	-3.688	0.000*	-2.166	0.034**	-2.342	0.022**
Intercept		3.259	0.002**	0.840	0.404	1.330	0.187
Model Summary							
Adjusted R-Squared			0.552		0.364		0.459
F-Statistic			22.829		5.339		12.114
p-value			0.000*		0.000*		0.000*

Where:

* = significant at p<0.001; ** = significant at p<0.05; *** = significant at p<0.10.

Model 4 Equation: $VAIC^{TM} = a_1 - \alpha_1 InsidePerGender + \alpha_2 OutsidePerGender - \alpha_3 Lev + \alpha_4 DivYield + \alpha_5 Size + \alpha_6 R\&Dsen - \alpha_7 OwnerCon + \epsilon$

Model 5 Equation: $VAIC^{TM} = a_1 + \alpha_1 InsidePerEthnic + \alpha_2 OutsidePerEthnic - \alpha_3 Lev + \alpha_4 DivYield + \alpha_5 Size + \alpha_6 R\&Dsen - \alpha_7 OwnerCon + \epsilon$

Model 6 Equation: $VAIC^{TM} = a_1 - \alpha_1 InsidePerGender + \alpha_2 OutsidePerGender - \alpha_3 InsidePerEthnic + \alpha_4 OutsidePerEthnic - \alpha_5 Lev + \alpha_6 DivYield + \alpha_7 Size + \alpha_8 R\&Dsen - \alpha_9 OwnerCon + \epsilon$

Diversity of Gender on Board of Directors (InsidePerGender): - Percentage of inside female representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

Diversity of Inside Ethnic Groups on Board of Directors (InsidePerEthnic): - Percentage of inside non-white representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

Diversity of Gender on Board of Directors (OutsidePerGender): - Percentage of Outside female representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

Diversity of Inside Ethnic Groups on Board of Directors (OutsidePerEthnic): - Percentage of outside non-white representation on the board of directors at the time the latest annual report prior to December 31, 2001 was published.

Leverage (Lev): - total debt divided by total shareholders' equity as reported in each firm's annual report; negative relationship to dependent variable.

Dividend Yield (DivYield): - percentage of cash dividends paid during 2001 divided by total shareholders' equity; positive relationship to dependent variable.

Firm Size (Size): - natural log of annual sales as reported in each firm's annual report; positive relationship to dependent variable.

R&D Sensitivity (R&Dsen): - dummy variable with firm's determined to be research and development intensive (see endnote 14) coded a one (1), otherwise coded a zero (0) (technique used in prior research such as Wruck (1993) and Sanders and Carpenter, 1998); positive relationship to dependent variable.

Ownership Concentration (OwnerCon): - percentage of outstanding shares owned by the firm's major shareholders divided the company's total number of outstanding shares. A firm's major shareholder was defined as a shareholder holding more than 5% of the company's total outstanding shares; negative relationship to dependent variable.

Appendix A. Steps in Calculating $VAIC^{TM}$

Step Number	Description of Step	Algebraic Description of Step
One	Calculation of value added during accounting period. Value added (VA) is the difference between a company's output (Output) (overall revenue from all products and services sold in the market) less inputs (Input) (total expenses, excluding labour costs, incurred in generating its output).	$VA = Output - Input$
Two	Ratio of value created from each unit of capital employed (CE) (physical and financial capital) by a company. This is termed the Value Added Capital Coefficient (VACA).	$VACA = VA / CE$
Three	Calculation of the company's efficient use of its human capital (HU). This is the ratio of the amount of value added for each unit spent on the company's employees. This ratio is defined as the Human Capital Coefficient (VAHU).	$VAHU = VA / HC$
Four	Relationship between a company's structural capital (SC) (defined by Edvisson as Intellectual capital minus human capital) and the amount of value added. This relationship is calculated differently to VAHU because HC and SC are considered to be in reverse proportion to the creation of value. This is termed the Structural Capital Coefficient (STVA)	$STVA = SC / VA$
Five	$VAIC^{TM}$ is the sum of the Value Added Capital Coefficient, Human Capital Coefficient and Structural Capital Coefficient.	$VAIC^{TM} = VACA + VAHU + STVA$